ROBOTICS

Operating manual

Robot Control Mate

Trace back information:
Workspace 23C version a2
Checked in 2023-09-08
Skribenta version 5.5.019

Operating manual

Robot Control Mate

RobotWare 7.12

Document ID: 3HAC073107-001

Revision: P

© Copyright 2019-2023 ABB. All rights reserved.
Specifications subject to change without notice.

The information in this manual is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this manual.

Except as may be expressly stated anywhere in this manual, nothing herein shall be construed as any kind of guarantee or warranty by ABB for losses, damage to persons or property, fitness for a specific purpose or the like.

In no event shall ABB be liable for incidental or consequential damages arising from use of this manual and products described herein.

This manual and parts thereof must not be reproduced or copied without ABB's written permission.

Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

© Copyright 2019-2023 ABB. All rights reserved.
Specifications subject to change without notice.

Table of contents

Overview of this manual 7
Product documentation 10

1 About the Robot Control Mate 13

2 Safety 17

3 Getting started 21

3.1 Getting started with the Robot Control Mate RS Add-In in RobotStudio 22
3.2 Getting started with the Robot Control Mate Web 25

4 Working with the Robot Control Mate 29

4.1 Controller configuration for Robot Control Mate 29
4.1.1 General configuration 29
4.1.2 Robot Control Mate on the MGMT port 30
4.1.3 Robot Control Mate on the WAN port 31
4.2 Working with the Robot Control Mate RS Add-In in RobotStudio 33
4.2.1 User interface of Robot Control Mate RS Add-In 33
4.2.2 Procedure 34
4.3 Working with the Robot Control Mate Web 39
4.3.1 User interface of Robot Control Mate Web 39
4.3.2 Procedure 41

5 Reference information 55

5.1 Features in RobotStudio 55
5.2 Scenarios for controllers with FlexPendant 61

6 Troubleshooting 63

6.1 What should I do if I experience a certificate failure when opening Robot Control Mate Web? 63

Index 65

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

Overview of this manual

About this manual

This manual contains instructions supported by Robot Control Mate which is to be used in conjunction with an OmniCore based robot. The instructions detail the usage for moving, modification of position, controlling and calibration.

Usage

This manual should be read before operation.

Who should read this manual?

This manual is intended for:

- operators
- product technicians
- service technicians
- robot programmers

Prerequisites

The reader should:

- Be trained in robot operation.
- Have basic knowledge of RAPID programming language.
- Be familiar with RobotStudio.

References

Reference	Document ID
Operating manual - RobotStudio	*3HAC032104-001*
Product manual - OmniCore C30	*3HAC060860-001*
Product manual - OmniCore C90XT	*3HAC073706-001*
Product manual - OmniCore E10	*3HAC079399-001*
Product specification - OmniCore C line	*3HAC065034-001*
Product specification - OmniCore E line	*3HAC079823-001*
Operating manual - OmniCore	*3HAC065036-001*
Operating manual - Integrator's guide OmniCore	*3HAC065037-001*
Technical reference manual - System parameters	*3HAC065041-001*
Application manual - Functional safety and SafeMove	*3HAC066559-001*

Revisions

Revision	Description
A	Released with RobotWare 7.0.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Continued

Revision	Description
B	The following updates are made in this revision: • Added a new installation method. • Updated the user interface figures of **Jog** tab page and **Calibrate** tab page. • Updated the calibration step.
C	The following updates are made in this revision: • Updated the installation, uninstallation and upgrade procedures.
D	The following updates are made in this revision: • Updated safety related information. • Updated the installation and upgrade method. • Added new functions to **Jog** and **Control** tab pages. • Added resolver data transfer function between robot memory and controller to **Calibrate** group. • Updated the procedure of working with the PC Jogging add-in. • Added warning before starting revolution counter update process.
E	Released with RobotWare 7.0.2. The following updates are made in this revision: • Renamed the product as Robot Control Mate from PC Jogging. • Restructured the manual to provide step-by-step procedures on controlling and jogging functions. • Added a note reminding users to disconnect the FlexPendant from the FlexPendant UI. • Updated the installation, uninstallation and upgrade procedures.
F	The following updates are made in this revision: • Removed the limitation requiring only one task exists. • Added the step of task selection when program executions are performed in multitask scenarios.
G	Released with RobotWare 7.1. The following updates are made in this revision: • Added steps to activate operator safety function AllowMoveRobAuto for controllers in RobotWare 7.1. • Updated steps for disconnecting the FlexPendant.
H	Released with RobotWare 7.2. The following updates are made in this revision: • Wording change from "jog" to "auto-jog". • Updated supported RobotWare and RobotStudio versions, and related descriptions. • Supported IRB 1100, IRB 1300 and IRB 14050. • Added IRB 14050-specific functions, such as LeadThrough and auto-jogging in arm mode, are added. • Added interface to use part of Authenticate functionalities in Robot Control Mate. • Added steps to edit user grants to make sure control and auto-jogging functions are available to use. • Updated the safety related information.
J	Released with RobotWare 7.5. The following updates are made in this revision: • Supported web-based Robot Control Mate. • Supported CRB 1100, IRB 920 and IRB 1200. • Wording change from "auto-jog" to "move". • Modified the UAS-related descriptions for the Robot Control Mate add-in in RobotStudio.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Revision	Description
K	Released with RobotWare 7.7. The following updates are made in this revision: • Supported IRB 1010. • Supported working on tablet. • Supported working with controllers connected via WAN port, and added requirements when the WAN port is used for connection, such as requesting token to enable moving functions. • Renamed Robot Control Mate add-in to Robot Control Mate RS add-in. • Added procedure of setting execution functions for web-based Robot Control Mate. • Added procedures of working with data and I/O.
L	Released with RobotWare 7.8. The following updates are made in this revision: • Supported CRB 15000. • Updated required RobotStudio version to version 2022. • Updated the safety related information. • Added a note about using the physical enabling device associated with **Verify Local Presence** and **Verify Move Robot in Auto**. • Added troubleshooting to handle the certificate failure when working with Robot Control Mate Web.
M	The following updates are made in this revision: • Restructured the manual. • Updated the naming of the Robot Control Mate variants in the manual to official naming Robot Control Mate RS Add-In and Robot Control Mate Web. • Supported CRB 1300. • Updated the prerequisites to use the Robot Control Mate. • Updated the user interface description for Robot Control Mate Web.
N	Released with RobotWare 7.10. The following updates are made in this revision: • Supported IRB 360, IRB 930 and new variants of CRB 15000. • Updated prerequisites for working with CRB 15000. • Added the procedure of viewing safety controller configurations for Robot Control Mate Web. • Added a displayed message when running program in Robot Control Mate Web. • Added procedures of editing Move instructions and deleting instructions.
P	Released with RobotWare 7.12. The following updates are made in this revision: • Supported IRB 1090. • Wording change from "lead-through" to "hand guiding". • "Installation Manager" replaced by "Modify RobotWare". • Updated safety information.

© Copyright 2019-2023 ABB. All rights reserved.

Product documentation

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

Tip

All documents can be found via myABB Business Portal, *www.abb.com/myABB*.

Product manuals

Manipulators, controllers, DressPack, and most other hardware is delivered with a **Product manual** that generally contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation or electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Calibration.
- Troubleshooting.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with corresponding figures (or references to separate spare parts lists).
- References to circuit diagrams.

Technical reference manuals

The technical reference manuals describe reference information for robotics products, for example lubrication, the RAPID language, and system parameters.

Application manuals

Specific applications (for example software or hardware options) are described in **Application manuals**. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful).
- What is included (for example cables, I/O boards, RAPID instructions, system parameters, software).
- How to install included or required hardware.
- How to use the application.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

- Examples of how to use the application.

Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and troubleshooters.

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

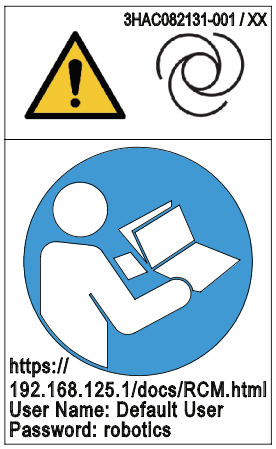
1 About the Robot Control Mate

Introduction

Overview

The Robot Control Mate provides basic instructions for OmniCore-based robot systems. In cases where a FlexPendant is unavailable, the Robot Control Mate allows users to control the robot from a connected PC or tablet.

Controllers supporting the Robot Control Mate (option 3065-1 Robot Control Mate) are attached with a safety warning label. This label indicates that the controller is delivered and can start in automatic mode, and use Robot Control Mate to control the robot in scenarios without a FlexPendant.



xx2100000357

Robot Control Mate works in two ways, RobotStudio add-in and web-based HMI. Key functions provided in two ways are the same.

Key functions

- Moving

  With combined selection of the motion mode and coordinate system, the robot can be moved to a specific position.
- Position modification

  You can define a desired target point in the RAPID instruction and use the target point to modify the robot position.
- Controlling

  It allows you to make the motors on and off. It also displays the program control buttons.
- Calibration

  It allows you to update the revolution counter of one or all axes for the robot, as well as memory data transfer between robot and controller.
- Status display

  You can have a quick view on the controller status, such as operating mode, speed, motor state and program execution state.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Continued

Prerequisites

To use and operate the robot through Robot Control Mate, the following are required.

Item	Requirement	Required by...	
		Robot Control Mate RS Add-In	Robot Control Mate Web
Controller	OmniCore controller with RobotWare 7.8[i]	X	X
Robot	IRB 360, IRB 910INV, IRB 920, IRB 930, IRB 1010, IRB 1090, IRB 1100, IRB 1200, IRB 1300, IRB 14050, CRB 1100, CRB 1300 and CRB 15000 are supported. Detailed information about each robot can be found in its product manual.	X	X
CRB 15000	To fulfill ISO 10218-1:2011 5.13 Movement without drive power, a FlexPendant must be available on the site when using RobotWare 7.10 and higher.	X	X
RobotStudio	RobotStudio 2022[i]	X	X
PC/tablet	• OS: Windows 10, 64-bit • CPU: 2GHz or faster processor, more cores recommended • RAM: 4GB at minimum • Resolution: 1024 x 768 Pixels (PC) or 1920 x 1200 Pixels (tablet) • Screen display size (tablet): 10.1 inches or larger • An account with administrator's privileges	X	X
Browser	**Google Chrome** is recommended.		X
Application risk assessment	Assess use of Robot Control Mate when robot is in automatic mode. See ISO 12100 and ISO 10218-2. Always consider the FlexPendant as an alternative.	X	X
Emergency stop device	Supplied by integrator, connected to the robot, and accessible. See ISO 13850 and appropriate controller manual listed in *References on page 7*.	X	X
Activation button	Installed as described in *Activating login as local client on page 30* and *Enabling moving functions on page 31*.	X	X
Safety configuration[ii]	Validated before use, see *Application manual - Functional safety and SafeMove*, ISO 10218-2 and ISO/TS 15066 (collaborative applications). FlexPendant is recommended for configuration and synchronization.	X	X
Safeguards	Shall be in place as a result of the risk assessment.	X	X

[i] The latest version of Robot Control Mate does not compatible with RobotWare and RobotStudio versions earlier than the specified ones. Always update RobotWare and RobotStudio to the required versions to use the latest Robot Control Mate.

[ii] For collaborative applications, please refer to respective product manual for the safety related functionality offered by ABB:
- *Product manual - IRB 14050*
- *Product manual - CRB 1100*
- *Product manual - CRB 1300*
- *Product manual - CRB 15000*

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Continued

Limitation

The Robot Control Mate,

- Can only be used in Automatic Mode.
- Supports hand guiding for the IRB 14050 and CRB 15000 only.

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

2 Safety

Safety information

Note

Make sure to read through all the safety instructions before starting work.

Note

The integrator must correctly design, install and validate all the safety devices and functionality required to protect people working with the robot system. The design must be based on a risk assessment of the application. Significant potential hazards for robot systems are listed in ISO 10218-2. ISO 12100 provides examples of the hazards associated with machines.

The integrator is responsible for the safety of the final application.

The OmniCore controller provides safety functions to ensure the safe operation with robots. Robot Control Mate is allowed to work in automatic mode only with all safety means in place.

Using an emergency stop button

An emergency stop button must be connected to the external emergency stop input interface to make sure the emergency stop function is enabled. The emergency stop switch must be positioned in easily accessible places so that the robot can be stopped quickly.

For details about how to connect an external emergency stop button, see the product manual of the controller.

Note

ABB provides only the emergency stop function. Users have to prepare the emergency stop switch by their own.

Leaving enabling device connection open

The enabling device connection must be left open if there is no teach pendant connected to the controller. Then, the robot can only work in automatic mode.

For details about how to configure the enabling device connection, see the product manual of the controller.

Activating a safety guard device

Safeguards must be activated before working with the Robot Control Mate in automatic mode. The protection chosen depends on both the application and the robot.

For common hazards, refer to ISO 10218-2 and normative references.

For details of how to connect an automatic stop, see the product manual of the corresponding controller.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Continued

For collaborative applications, ABB offers a portfolio of functionality which can support the design of a safe application. Please refer to respective product manual:

- *Product manual - IRB 14050*
- *Product manual - CRB 1100*
- *Product manual - CRB 1300*
- *Product manual - CRB 15000*

The FlexPendant should be used to set up the safety configuration for the CRB 1100, CRB 1300 and CRB 15000 robots before using the Robot Control Mate. Assistance is provided in the SafeMove Configurator app.

The FlexPendant is also recommended for the IRB 14050 with SafeMove, to synchronize the joint positions so that it can run in automatic mode.

Using the FlexPendant to reduce risks

The FlexPendant is always the optimum solution to reduce risks in many applications. Before using Robot Control Mate, working environment and applications in use must be thoroughly assessed. The integrator must make sure that the risks are reduced sufficiently to allow to use Robot Control Mate in automatic mode. If any unacceptable risk remains, use FlexPendant in manual mode as a mitigation.

Body protection

- Sensitive body parts, such as the eyes and the larynx, must be protected by personal protective equipment (PPE).
- Operators working with the Robot Control Mate must be trained and have the required knowledge.

Network security

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide, and continuously ensure, a secure connection between the product and to your network or any other network (as the case may be).

You shall establish and maintain any appropriate measures (such as, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its entities are not liable for damage and/or loss related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Robot Control Mate functions work based on the connection to the OmniCore controllers and communication via a network interface. Security aspects must always be concerned. For more details about the OmniCore Cybersecurity, see *Operating manual - Integrator's guide OmniCore*.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Starting work with safety awareness

Whenever starting work with Robot Control Mate, check whether Robot Control Mate is connected to the correct robot.

- Check the controller status, either by reviewing the Controller Status group for Robot Control Mate RS Add-In or by using the status bar for Robot Control Mate Web.
- For CRB 15000, the LED lights on the arm-side interface (ASI) can be used for a simple check. For details, see section "Testing the FlexPendant Connection" in *Product manual - CRB 15000*.

Monitoring robot motion and conditions for logging out

During work with Robot Control Mate, make sure no obstacle blocking operators' view of the robot. Operators should continuously observe and pay attention to motion of the robot.

To minimize risks, the operator must log out the Robot Control Mate in any of following circumstances:

- the emergency stop buttons for the applications under control are out of reach.
- the robot is out of sight.
- interaction with the robot is no longer required.
- the browser opening the Robot Control Mate Web is to be closed.

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

3 Getting started

General preparation

Before using the Robot Control Mate, make sure:

1. RobotStudio has been downloaded, installed and activated on the PC/tablet.

   Download RobotStudio from *http://new.abb.com/products/robotics/robotstudio/downloads*. For more information about how to install and run the RobotStudio, see *Operating manual - RobotStudio*.

2. The PC/tablet is connected to the controller via the MGMT port (management port) using a wired cable or WAN port, and that the controller is powered on.

   For more information about the PC connection to the controller, see section *Connecting a PC to the controller* in *Operating manual - RobotStudio*.

   - if using the MGMT port for connection, make sure the PC/tablet opening the Robot Control Mate Web has connected to the required controller via the MGMT port using a wired cable and works in the same local subnet of the controller.
   - if using the WAN port for connection, make sure the network and firewall settings have been properly configured for the controller, and the IP address of the connected PC/tablet is in the same network segment as the IP address set for the controller.

     For detailed procedures of controller network and firewall configuration, see section *Ethernet networks on OmniCore* in *Operating manual - Integrator's guide OmniCore*.

Note

Virtual controllers are always considered as connecting to the WAN port.

Note

If the controller is in a RobotWare version earlier than the one specified in *Prerequisites on page 14*, upgrade it to the required RobotWare version first.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

3.1 Getting started with the Robot Control Mate RS Add-In in RobotStudio

Installing the Robot Control Mate RS Add-In

Use the following procedure to install the Robot Control Mate RS Add-In:

1. Start RobotStudio and open the **Add-Ins** tab. The **Gallery** window is displayed.
2. In the **Gallery** window, enter **Robot Control Mate RS Add-In** in the **Search** text box.

   The **Robot Control Mate RS Add-In** icon is displayed.

xx2100002548

3. Click the icon and then click **Add** on the right pane.
4. Click **Accept** in the displayed disclaimer window.

   The package will be downloaded and installed automatically. The installed package can be observed in the **RobotStudio Add-Ins** navigation tree in the left pane of the window.
5. Close and reopen RobotStudio.

   The **Robot Control Mate** icon is displayed in the **Controller** ribbon tab.

Starting the Robot Control Mate RS Add-In

Use this procedure to open the Robot Control Mate RS Add-In:

1. Open RobotStudio.
2. Connect to a controller and log in.
3. In the **Controller** tab page, click **Robot Control Mate** in the **Robot Tools** group.

   The **Robot Control Mate** ribbon tab is displayed.

> **Note**
>
> The Heartbeat function must be activated to use the Robot Control Mate. If it is not, a message is displayed when the Robot Control Mate is logged in, requesting to activate the function.
>
> Click **Yes** in the request window to activate the heartbeat function and restart the controller.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

> **Note**
>
> The Robot Control Mate must be closed by clicking **Close** in any of following circumstances:
>
> - the emergency stop buttons are out of reach.
> - the robot is out of sight.
> - interaction with the robot is no longer required.

4 In the **Controller** tab page, click **Request write access** to have the write access granted.

5 Back to the **Robot Control Mate** tab page and start working with the Robot Control Mate after connecting to a controller.

> **Note**
>
> If there is no controller connected, **Unknown** will be displayed in the **Controller Status** group, and the control and move functions are unavailable to use.
>
> If it is a virtual controller connected, you have to open a new RobotStudio program, add the virtual controller by clicking **Add Controller** from the **Controller** tab and then log in using a user account with necessary grants to activate the Robot Control Mate functions.

Uninstalling the Robot Control Mate RS Add-In

Use the following procedure to uninstall the Robot Control Mate RS Add-In.

1 Open RobotStudio and click the **Add-Ins** tab.

2 In the **Add-Ins** window on the left pane, right-click the **Robot Control Mate RS Add-In** package under the **Installed Packages** navigation tree.

3 Choose **Uninstall Package** from the shortcut menu.

4 Click **Yes** to proceed.

The uninstallation procedure starts automatically.

5 Close and reopen RobotStudio.

The **Robot Control Mate RS Add-In** is removed from the navigation tree on the left pane.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Upgrading the Robot Control Mate RS Add-In

If a new version of the Robot Control Mate RS Add-In is available, uninstall the earlier versions as instructed in *Uninstalling the Robot Control Mate RS Add-In on page 23* and then reinstall as instructed in *Installing the Robot Control Mate RS Add-In on page 22*.

Note

If RobotStudio is in a version earlier than the one specified in *Prerequisites on page 14*, upgrade RobotStudio to the required version first and then install the Robot Control Mate RS Add-In in **Gallery** as instructed in *Installing the Robot Control Mate RS Add-In on page 22*.

© Copyright 2019-2023 ABB. All rights reserved.

3.2 Getting started with the Robot Control Mate Web

Installing the Robot Control Mate Web

Generally, Robot Control Mate Web is integrated in the controller system at delivery. It is also available to be downloaded from RobotStudio Gallery and then installed to the controller. If you need to newly add it to an existing controller system or requires an update, follow the following procedure to install:

1. Start RobotStudio and open the **Add-Ins** tab. The **Gallery** window is displayed.
2. In the **Gallery** window, enter **Robot Control Mate Web** in the **Search** text box.

   The **Robot Control Mate Web** icon is displayed.

xx2100002549

3. Click the icon and then click **Add** on the right pane.

   The package is automatically installed and listed in the **RobotWare Add-Ins** navigation tree in the left pane of the window.
4. In the **Controller** tab, select the **Modify RobotWare** function.
5. In the **Controller** tab, select **Add Controller** > **Connect to Controller** to connect to a real controller or select/create a virtual controller.
6. Follow the instructions in the installation wizard and add the Robot Control Mate Web (3065-1 Robot Control Mate) to the controller.

   The Robot Control Mate Web is displayed in the controller overview if it is successfully added to the controller.

   For details about how to use the **Modify RobotWare** function, see *Operating manual - RobotStudio*.

Logging in the Robot Control Mate Web

Use the following procedure to log in the Robot Control Mate Web:

1. Start the browser.

   Google Chrome is recommended.
2. Enter the IP address of the connected controller in the address bar.
   - If a virtual controller is connected, enter **https://127.0.0.1:80/docs/RCM.html**.
   - If a real controller is connected via MGMT port, enter **https://192.168.125.1/docs/RCM.html**.
   - If a real controller is connected via WAN port, enter **https://***IP address of WAN port*/**docs/RCM.html**.
3. In the displayed window, enter the user name and password.

   You can log in using any user account but make sure the account has the access permission to the connected controller.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Note

Displayed language for Robot Control Mate Web is the same as the language of controller system. Currently, only English and Chinese are available.

If the controller system is in a language other than English or Chinese, a dialog box is popped up during the Robot Control Mate Web startup, for users to choose the displayed language of Robot Control Mate.

It is also possible to change the displayed language by clicking the menu button on the homepage and then choosing **About** > **Language**.

Note

The Robot Control Mate Web must be logged out from the controller system by clicking **Log out** from the menu in any of following circumstances:

- the emergency stop buttons are out of reach.
- the robot is out of sight.
- interaction with the robot is no longer required.
- the browser opening the Robot Control Mate Web is to be closed.

Checking the system settings

Before entering the main working page, Robot Control Mate Web will automatically check the system settings required for running the Robot Control Mate Web. Follow the procedure below to get the system settings ready first:

1. In the **Home** page, check the robot model to make sure that the required one is connected to.
2. Click **Start**.
3. Read carefully the prompted message and click **Acknowledge** to accept it.

   You can also click **Open quickstart guide** to get the latest manual version for more details.
4. Configure the system settings if any listed item is not configured as required.
   - If the AllowMoveRobAuto or Heartbeat function is not activated, click **Configure** and then click **Active and Start** in the displayed dialog box to activate them.

     You have to re-enter the page after restarting the controller and then the latest state is displayed.

     Note

     You can also activate the AllowMoveRobAuto and Heartbeat function in RobotStudio, see detailed procedures in *Activating the AllowMoveRobAuto function on page 29* and *Activating the Heartbeat function on page 29*.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

- If not working as a local client, click **Request** to login as local client.

  Note

  Logging in as a local client is required only when the controller is connected via the MGMT port.

  You also need to prepare a physical activation button and configure an associated signal for local client, see detailed procedures in *Activating login as local client on page 30*.

- If the controller is in Manual mode, click **Change** and follow the instructions to change the operation mode to Auto.

  Note

  If the controller is connected via the WAN port, the operation mode can only be changed by reconnecting the controller via the MGMT port, logging in as a local client, clicking **Change** and then following the instructions to change the operation mode to Auto.

The working page displays after all the required system settings are correctly configured.

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

4 Working with the Robot Control Mate

4.1 Controller configuration for Robot Control Mate

4.1.1 General configuration

Connecting to a controller

1. Switch on the main power on the controller.
2. Open RobotStudio.
3. Add a controller by choosing **One Click Connect** from the **Add Controller** category in the **Controller** ribbon tab.

   Note

   You can also choose **Add Controller** or **Add Controller from Device List** and then select the desired controller from the list.
4. Log in the controller using the user name and password.
5. The controller is loaded and displayed in the navigation tree.

Activating the AllowMoveRobAuto function

1. On the **Controller** ribbon tab in RobotStudio, click **Request Write Access**.
2. In the **Controller** navigation tree, choose **Configuration** > **Controller**.
3. Click **Operator Safety** to display the settings.
4. Set **AllowMoveRobAuto** to **True**.
5. Restart the controller.

Activating the Heartbeat function

1. On the **Controller** ribbon tab in the RobotStudio, click **Request Write Access**.
2. In the **Controller** navigation tree, choose **Configuration** > **Controller**.
3. Click **Operator Safety** to display the settings.
4. Set **HeartBeat** to **True**.
5. Restart the controller.

© Copyright 2019-2023 ABB. All rights reserved.

4.1.2 Robot Control Mate on the MGMT port

Activating login as local client

If users are not logged in as local client when a real controller is connected via MGMT port, the moving functions are unavailable to use and a warning message will be displayed. Users have to login as local client to enable the functions.

Make sure a physical activation button is prepared and associated signal for local client has been configured for the device.

Login as local client in the following two ways:

- With a powered-on FlexPendant but in logged-out state
  1. Open theRobot Control Mate, either RS add-in version or Web version, and then open the **Move** window.
  2. Press the activation button twice.
  3. Check whether functions are enabled in the **Move** window.
- Without a FlexPendant
  1. In the **Controller** ribbon tab in the RobotStudio, click **Configuration** and then click **I/O system**.
  2. In the **Type** pane of the **Configuration - I/O system** window, right-click **Signal** and choose **New Signal**.
  3. Create a physical DI signal.
  4. Double-click **Controller** in the **Configuration** navigation tree on the left pane.
  5. In the **Type** pane of the **Configuration - Controller** window, right-click **System Input** and choose **New System Input**.
  6. Choose the created physical DI signal from the **Signal Name** drop-down list.
  7. Choose **Verify Local Presence** from the **Action** drop-down list.

     Note

     The physical activation button associated with **Verify Local Presence** must be obviously labelled, so that its function is clear. It must be situated within reach of an emergency stop button.

  8. Save the change and restart the controller.
  9. Activate login as local client.
     - For Robot Control Mate RS Add-In, open the **Move** window and change the DI signal value twice using the physical activation button for whom the signal created.
     - For Robot Control Mate Web, open the **Home** page and observe the Get local client item is checked as available; otherwise, click **Request** to activate.

© Copyright 2019-2023 ABB. All rights reserved.

4.1.3 Robot Control Mate on the WAN port

Enabling control functions

Current user must be granted with the Remote Start and Stop right to enable the control functions. Otherwise, control functions are unavailable to use.

Perform the following procedure to edit user grants:

1. On the **Controller** ribbon tab in RobotStudio, click **Authenticate** and then click **Edit User Accounts**.
2. In the **Edit User Accounts** window, click the **Roles** tab.
3. On the **Roles** tab, select the role to which the user belongs and then click **Edit User**.
4. Select the **Remote Start and Stop in Auto** checkbox.
5. Click **Apply**.

More details about how to manage user rights in the UAS system, see *Operating manual - RobotStudio*.

Enabling moving functions

Users have to connect an activation button and configure a token signal for it to enable the moving functions. The moving functions are only available after the token is verified.

Use the following procedure to configure the token and enable moving functions:

1. Prepare a physical activation button and connect it to the controller.
2. Open the RobotStudio.
3. In the **Controller** ribbon tab, click **Configuration** and then click **I/O system**.
4. In the **Type** pane of the **Configuration - I/O system** window, right-click **Signal** and choose **New Signal**.
5. Create a physical DI signal for the connected activation button.
6. Double-click **Controller** in the **Configuration** navigation tree on the left pane.
7. In the **Type** pane of the **Configuration - Controller** window, right-click **System Input** and choose **New System Input**.
8. Choose the created physical DI signal from the **Signal Name** drop-down list.
9. Choose **Verify Move Robot in Auto** from the **Action** drop-down list.
10. Save the change and restart the controller.
11. Enable the moving functions.
    - For Robot Control Mate RS Add-In, open the **Move** window and click **Get Move In Auto Token**.
    - For Robot Control Mate Web open the **Move** working page and click **Enable Move**.
12. Press the activation button within 30s.
    - If the token is verified and requested successfully, proceed to next step.
    - If the token fails to be verified and requested, an error message will display.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

13 Click **OK** in the displayed message box.

The moving functions are available to use.

> **Note**
>
> The physical activation button associated with **Verify Move Robot in Auto** must be obviously labelled, so that its function is clear. It must be situated within reach of an emergency stop button.

The default timeout to disable moving functions is 30s. If no moving action is implemented within 30s, the moving functions will be disabled.

It is possible to modify the duration for timeout in the following two ways:

- In the message box displayed after pressing the activation button, click **Change the duration**, and in the displayed window, click **Move in Auto Timeout** to change the duration.
- Click the **Menu** button and then click **About.** In the displayed window, click **Move in Auto Timeout** to change the duration.

If the duration is set to a value larger than 40s, a message pops up, reminding users that the moving functions will be disabled within 30s; if the duration is set to a value equal to or smaller than 40s, the message will reminder that the functions will be disabled within 5s.

If the functions are disabled, users have to click **Get Move In Auto Token** or **Enable Move** to enable them again.

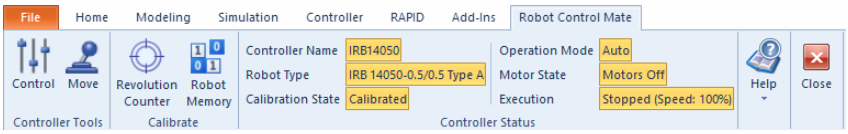
> **Note**
>
> For Robot Control Mate Web, the **Go to position** function for the position data also requires the token to enable.

© Copyright 2019-2023 ABB. All rights reserved.

4.2 Working with the Robot Control Mate RS Add-In in RobotStudio

4.2.1 User interface of Robot Control Mate RS Add-In

Overview



xx1900001318

Group	Description
Controller Tools	Provides controlling and moving functions, such as motor status switching, program execution and robot movement.
Calibrate	Provides calibration functions to update revolution counters and to transfer robot memory between robot and controller.
Controller Status	Displays the basic information of the controller and robot.
Help	Displays the help documentation.
Close	Closes the **Robot Control Mate** tab.

© Copyright 2019-2023 ABB. All rights reserved.

4.2.2 Procedure

Introduction

This section describes the procedures to operate a robot system using the Robot Control Mate RS Add-In together with RobotStudio features.

Safety information

Whenever starting work with Robot Control Mate, check whether Robot Control Mate is connected to the correct robot.

- Check the controller status by reviewing the **Controller Status** group for Robot Control Mate RS Add-In.
- For CRB 15000, the LED lights on the arm-side interface (ASI) can be used for a simple check. For details, see section "Testing the FlexPendant Connection" in *Product manual - CRB 15000*.

Performing the program executions

1. Check the calibration status of the robot in the **Controller Status** group in the **Robot Control Mate** tab page.

   If the robot is uncalibrated, calibrate the robot as instructed in *Calibrating the robot on page 36*.
2. In the **Controller** tab page, click **Request write access** to have the write access granted.
3. In the **Robot Control Mate** tab page, click **Control** in the **Controller Tools** group.

   The **Control** window is displayed.
4. Turn the motors on.
5. Select a task from the **Selected Tasks** drop-down list.

   If there are multiple tasks, the program executes for the selected task.
6. Set the speed of program execution by dragging the scroll bar.

   The speed of 100% indicates that the program is running at full speed.
7. Perform program executions.
   - **Play**: starts the program execution.
   - **Stop**: pauses a program execution.
   - **Prev**: executes one instruction backward.
   - **Next**: executes one instruction forward.

> **Note**
>
> Click **PP to Main** to set the program pointer to the first line of the main routine.
>
> It is also possible to set the program pointer to routine by selecting a module and routine from the **Module** and **Routine** drop-down list first, and then click **PP to Routine**.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Moving the robot

1 In the **Controller** tab page, click **Request write access** to have the write access granted.
2 In the **Robot Control Mate** tab page, click **Control** in the **Controller Tools** group.

   The **Control** window is displayed.
3 Turn the motors on.

> **Note**
>
> For IRB 14050 and CRB 15000, setting **Hand Guiding** to **Enable** in the **Move** window will automatically turn the motors on, and the **Operation Mode** displays **Hand Guiding**.

4 Click **Move** in the **Controller Tools** group.

   The **Move** window is displayed.

> **Note**
>
> If the controller is connected via WAN port, moving functions are available to use only after the token is verified. For details, see *Enabling moving functions on page 31*.

5 Select the moving mode.
   - **Joint**: this mode moves the robot axis by axis. It moves one robot axis at a time.
   - **Linear**: this mode enables the tool center point of the selected tool to move along straight lines from "point A to point B" in space or to move in rotational motion based on the selected coordinate system's axis.
   - **Arm**: this mode is only available for IRB 14050. In this mode, both the tool center point and the orientation of the tool is fixed in space and only the angle of the arm is changed. The tool center point is neither rotated nor moved.
6 Select the coordinate system.

   If **Tool** or **Wobj** is selected, a work object or tool must be selected from the **Work Object** or **Tool** drop-down list respectively, to specify the reference based on which the robot axis moves.
7 Select the increment mode.
   - **None**: the robot moves continuously to the specified point.
   - **Small**/**Medium**/**Large**: the robot will move a rated step each time based on the selected incremental movement size.
   - **Customized**: users can define increment step by clicking **Customized Increment**.
8 Set the moving speed by dragging the scroll bar.
9 (Optional) Select load data from the **Load** drop-down list.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.2.2 Procedure
Continued

If equipment is mounted on any of the robot axes, then axes loads must be set. Otherwise overload errors might occur during moving.

10 Click the **+** or **-** button in the **Position** area to move the robot axes to the desired position.

Note

The robot can also be moved using target settings. Select a target from the **Target** drop-down list. Detailed position information of the selected target point is displayed. Then, press and hold **Go to** to move the robot until it reaches the target position or click **Modify Position** to apply the robot position to the RAPID program.

Calibrating the robot

WARNING

Before starting the revolution counter update procedure, make sure all robot axes are moved to the synchronization position and all the notches of synchronization marks are aligned.

If a revolution counter is incorrectly updated, it will cause incorrect manipulator positioning, which in turn may cause damage or injury! Always verify the results after calibrating any robot axis to verify that all calibration positions are correct.

Detailed information about calibration, revolution counter update, and so on can be found in the robot product manual.

Note

Calibration procedure is slightly different for CRB 15000. See *Product manual - CRB 15000*.

1 In the **Controller** tab page, click **Request write access** to have the write access granted.
2 Check the calibration state in the **Controller Status** group in the **Robot Control Mate** tab page.
3 If the state is **Uncalibrated**, check whether controller or robot has been replaced or the SMB board has been replaced.
   - If yes, proceed to step *4*.
   - If no, proceed to step *8*.
4 In the **Robot Control Mate** ribbon tab, click **Robot Memory** in the **Calibrate** group.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

In the displayed **Update Memory** dialog box, choose **Update controller with robot memory data** or **Update robot memory with controller data** according to the actual situation.

> **CAUTION**
>
> Do not mix the memory data transfer direction.

For more details about memory data transfer, see *Operating manual - Integrator's guide OmniCore*.

5 A dialog box is displayed, warning that the transfer operation cannot be undone. Click **OK** to proceed or click **Cancel** to cancel.

6 After the data is successfully transferred, a message is displayed, warning that the controller requires to be restarted. Click **OK** to close the message.

7 Restart the controller.

8 In the **Robot Control Mate** ribbon tab, click **Revolution Counter** in the **Calibrate** group.

In the displayed **Update Revolution Counter** dialog box, check the calibration status of the axes and, in the **Selection** column, select the axes for which revolution counters need to be updated.

For more details about robot revolution counter update, see the robot product manual.

9 A dialog box is displayed, warning that the updating operation cannot be undone. Click **OK** to proceed or click **Cancel** to cancel.

10 After the revolution counters of the selected axes are successfully updated, a message is displayed, warning that the controller requires to be restarted. Click **OK** to close the message.

11 Restart the controller.

12 After the calibration is done, move the robot and check whether the robot is well calibrated.

For details about robot moving, see *Moving the robot on page 35*. If the robot is not correctly calibrated, calibrate again in the **Update Revolution Counter** dialog box.

Working with the robot system

1 Create a testing RAPID program or load an existing RAPID program in the RAPID editor.

For more information about how to work with RAPID editor, see *Operating manual - RobotStudio*.

2 Move the robot to a desired position in the **Move** window.

For details about robot moving, see *Moving the robot on page 35*.

3 Select a desired target point from the **Targets** drop-down list and click **Modify Position**.

4 In the **Robot Control Mate** ribbon tab, click **Control** in the **Controller Tools** group.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.2.2 Procedure
Continued

The **Control** window is displayed.

5 Run the RAPID program.

For details about how to execute the program, see *Performing the program executions on page 34*.

CAUTION

If the speed is higher than 10% of the fully speed, a warning message displays, prompting to confirm the running speed. Click **Yes** to remain the speed setting or click **No** to change the speed to 10% of the fully speed.

Make sure all risks are cleared before clicking **Yes** and run the program at a high speed. If any risky situation occurs, click **Pause** in the **Control** tab to stop the program or press the external emergency stop switch.

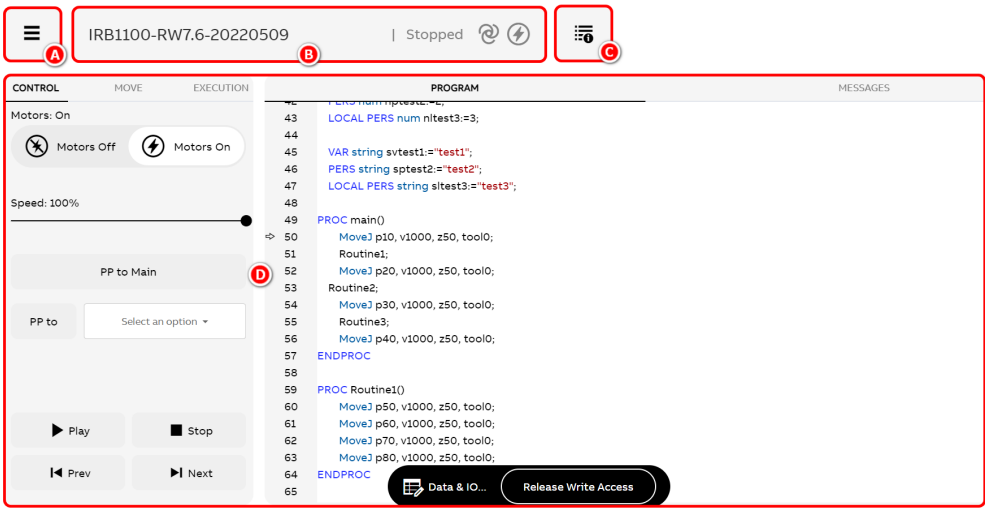
© Copyright 2019-2023 ABB. All rights reserved.

4.3 Working with the Robot Control Mate Web

4.3.1 User interface of Robot Control Mate Web

Overview

Taking the **CONTROL** working page as an example, the following figure shows the main working page in the Robot Control Mate Web.



xx2100002586

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.1 User interface of Robot Control Mate Web
Continued

	Item	Description	
A	Menu	Displays the menu when clicking the hamburger button. Information of the current user is also displayed in the menu page. You could log out the current user by clicking **Log out**.	
		Controller Tools	Accessing the controlling and moving functions.
		Calibration	Displaying the calibration status of the connected mechanical units, and providing interfaces for accessing calibration functions.
		Backup & Restore	Saving all system parameters, system modules, and program modules in a context to local as a .tar file or restoring the system from a backup file.
		Restart	Restarting the controller or resetting the system to the factory settings.
		Safety Controller	Accessing the window displaying safety controller configurations. Only available when the robot is selected with the SafeMove option.
		About	Displaying information about the Robot Control Mate Web version, open-source licenses and manuals, and also providing interfaces for following common settings. • **Move in Auto Timeout:** click to reset the timeout duration to disable moving functions. • **Language**: click to change the displayed language for Robot Control Mate Web. Currently only English and Chinese are available. • **Save diagnostics**: click to download the system diagnostics. • **Export RCM logs**: click to export the communication logs between Robot Control Mate Web and controller. • **Contact us**: click to access the ways to contact ABB.
		ASI	Available only for CRB 15000 with ASI application installed in the system. In the opened window, users can configure the buttons and light indicator on the arm-side interface. For more details about ASI settings, see *Product manual - CRB 15000*.
		Connected Service Status	Displaying the Connected Service status of the connected controller. Only available when the controller is installed with a Connected Service Gateway module and the module is configured. For more details about the Connected Service functionality, see the Product manual for the respective OmniCore controller and *Operating manual - Integrator's guide OmniCore*.
B	Status bar	Shows the controller status. You can also request or release write access by clicking the status bar and then clicking the **Request** or **Release** button in the displayed message page.	
C	Event log	Displays the event logs, which are messages about system status, events or errors. In the displayed event logs window, you can: • view the current event logs. • study specific event log in details. • change log status from unread to read by clicking **Acknowledge**. • clear all the log entries by choosing **Clear All** from the **More options** button on the upper right corner. • save all the log entries by choosing **Save log** from the **More options** button on the upper right corner.	
D	Working area	Displays the detailed setting pages. You have to request write access first to start working. For the controlling and moving functions, the programs and messages are also displayed in real time in the working area. The programs can only be viewed but not edited. It is possible to clear the messages by clicking **Clear messages**. Data and I/O information can be viewed and edited in corresponding tab page after clicking the **Data & IO** button at the bottom of the working area. For details, see *Working with data and I/O on page 48*.	

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure

Introduction

This section describes the procedures to operate a robot system using the Robot Control Mate Web.

> **Note**
>
> Always click **Request write access** to have the write access granted for proceeding the operations in the Robot Control Mate Web.
>
> If the write access is held by another user, it must be released by the user first and then requested by the current user.

Safety information

Whenever starting work with Robot Control Mate, check whether Robot Control Mate is connected to the correct robot.

- Check the controller status from the status bar for Robot Control Mate Web.
- For CRB 15000, the LED lights on the arm-side interface (ASI) can be used for a simple check. For details, see section "Testing the FlexPendant Connection" in *Product manual - CRB 15000*.

Performing the program executions

1. Click the **Menu** button and then click **Calibration** to check the calibration status of the robot.

   If the robot is uncalibrated, calibrate the robot as instructed in *Calibrating the robot on page 45*.
2. Click the **Menu** button and then click **Controller Tools**.

   The **CONTROL** working page is displayed.

   > **Note**
   >
   > The **CONTROL** working page is also the first page displayed when you enter the Robot Control Mate Web.
3. Turn the motors on.
4. Set the speed of program execution by dragging the scroll bar.

   The speed of 100% indicates that the program is running at full speed.
5. Perform program executions.
   - **Play**: starts the program execution.
     - If the program has been modified before executing, a message is displayed, promoting you to check the program in the reduced speed (max. 250 mm/s) step by step by using **Prev** and **Next**. You can click **Continue** to execute the modified program, or click **Cancel** to discard the execution .
     - If the program has been modified before executing and the speed is set to a value higher than 10%, another message is further

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

displayed, promoting you to confirm the speed at which the program executed. You can click **Play in 10% speed** to run the program at a lower speed, or click **Continue** to keep the current speed.

- **Stop**: pauses a program execution.
- **Prev**: executes one instruction backward.
- **Next**: executes one instruction forward.

> **Note**
>
> Click **PP to main** to set the program pointer to the first line of the main routine.
>
> It is also possible to set the program pointer to routine by selecting a routine from the **PP to** drop-down list.
>
> You can also set the program pointer to the cursor location by clicking the required instruction line in the program window first and then clicking **PP to cursor** at the bottom of the working area.

> **Note**
>
> If the controller is connected via WAN port, the play and stop buttons are available to use only when the user is granted with Remote Start and Stop in Auto. For details, see *Enabling control functions on page 31*.

Moving the robot

1 Turn the motors on in the **CONTROL** working page.

> **Note**
>
> For IRB 14050 and CRB 15000, turn on the **Hand Guiding** switch in the **MOVE** working page will automatically turn the motors on, and the status bar is highlighted.

2 Click the **MOVE** tab.

The **MOVE** working page is displayed.

> **Note**
>
> If the controller is connected via WAN port, moving functions are available to use only after the token is verified. For details, see *Enabling moving functions on page 31*.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

3 Select required mechanical unit, work object, tool and load from the corresponding drop-down list.

> **Note**
>
> If there is equipment mounted on any of the robot axes, the axis load data must be set. Otherwise overload errors might occur during moving.

4 Set the moving speed by dragging the scroll bar.

5 Select the moving mode by clicking the corresponding icon.

- **Axis**: this mode moves the robot axis by axis. It moves one robot axis at a time.
- **Linear & Reorient**: this mode enables the tool center point of the selected tool to move along straight lines from "point A to point B" in space or to move in rotational motion based on the selected coordinate system's axis.
  - If this moving mode is selected, the coordinate system drop-down list is displayed.
  - If **Tool** or **Wobj** is selected in the coordinate system drop-down list, a work object or tool must be selected from the work object or tool drop-down list respectively, to specify the reference based on which the robot axis moves.
- **Arm**: this mode is only available for IRB 14050. In this mode, both the tool center point and the orientation of the tool is fixed in space and only the angle of the arm is changed. The tool center point is neither rotated nor moved.

6 Select the increment mode.

- **No increment**: the robot moves continuously to the specified point.
- **Small**/**Medium**/**Large**: the robot will move a rated step each time based on the selected incremental movement size.
- **User**: users can define increment step by clicking the **Setting** icon on the left upper corner. In the displayed **User Increment** dialog box, set required values and click **Apply**.

7 Click the **+** or **-** button in the right pane to move the robot axes to a desired position.

8 If required, align the tool to another coordinate system by clicking **Align**.

In the displayed page, select the required coordinate system in the **Align to coordinate system** area. Click and hold the **Align** button until the tool is aligned.

For more details about the tool align, see *Operating manual - OmniCore*.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

> **Note**
>
> The robot can also be moved to a programmed position listed in the **Position** tab after clicking the **Data & IO** button at the bottom of the working area. Select a programmed position and click **Go to position** to move the robot from the current position to the selected position.

Setting execution functions

1. Click the **EXECUTION** tab.

   The **EXECUTION** working page is displayed.
2. Selects the program run mode.
   - **Single**: runs one cycle and then stops the execution.
   - **Continuous**: runs continuously
3. Select the program step mode.
   - **Step Over**: the called routines are executed in one single step.
   - **Step Into**: steps into the called routines and executes them step-by-step.
   - **Step Out**: executes the remaining part of the current routine and then stops at the next instruction in the routine from which the current routine was called. Not possible to use in the Main routine.
   - **Step Move**: steps to the next move instruction. Stops before and after movement instructions, for example, to modify positions.
4. Turn on **Non Motion Execution** to run the RAPID program without the robot motion.
5. In the **Enable/Disable Tasks** panel, select a task and click to enable or disable it.

   > **Note**
   >
   > Only when the Multitasking option is supported and more than one tasks are created, the tasks are listed. Otherwise, only the T_ROB1 task is listed.
6. Turn on the **Allow configuration of semistatic/static tasks** switch for configuring semistatic and static tasks.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

Calibrating the robot

WARNING

Before starting the revolution counter update procedure, make sure all robot axes are moved to the synchronization position and all the notches of synchronization marks are aligned.

If a revolution counter is incorrectly updated, it will cause incorrect manipulator positioning, which in turn may cause damage or injury! Always verify the results after calibrating any robot axis to verify that all calibration positions are correct.

Detailed information about calibration, revolution counter update, and so on can be found in the robot product manual.

Note

Calibration procedure is slightly different for CRB 15000. See *Product manual - CRB 15000*.

1 Click the **Menu** button and then click **Calibration**.

The calibration window is displayed.

2 Click the required robot from the **MECHANICAL UNITS** list.

The calibration summary is displayed in the right pane.

3 If the robot is uncalibrated, check whether controller or robot has been replaced or the SMB board has been replaced.

- If yes, proceed to step 4.
- If no, proceed to step 8.

4 Click **Robot Memory** at the bottom of the working area.

In the displayed **ROBOT MEMORY** page, choose **Update controller with robot memory data** or **Update robot memory with controller data** according to the actual situation.

CAUTION

Do not mix the memory data transfer direction.

For more details about memory data transfer, see *Operating manual - Integrator's guide OmniCore*.

5 Click **Apply**.

A dialog box is displayed, warning that the transfer operation cannot be undone. Click **Update** to proceed or click **Cancel** to cancel.

6 After the data is successfully transferred, a message is displayed, warning that the controller requires to be restarted. Click **OK** to close the message.

7 Restart the controller.

8 Click **Revolution Counter** at the bottom of the working area.

A dialog box is displayed, warning that the updating operation may change the programmed position. Click **Yes** to proceed or click **No** to cancel.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

9 In the displayed **Update Revolution Counters** dialog box, check the calibration status of the axes and select the axes for which revolution counters need to be updated.

For more details about robot revolution counter update, see the robot product manual.

10 Click **Update selected axes**.

A dialog box is displayed, warning that the updating operation cannot be undone. Click **Update** to proceed or click **Cancel** to cancel.

11 After the calibration is done, move the robot and check whether the robot is well calibrated.

For details about robot moving, see *Moving the robot on page 42*. If the robot is not correctly calibrated, calibrate again in the **Update Revolution Counter** dialog box.

Viewing safety controller configurations

Safety controller is a safety board used with the robot controller, handling SafeMove functionality. If the robot is selected with the SafeMove option, the **Safety Controller** tab is displayed in the menu for you to access basic setup functions of the safety controller. More information about safety controller, see *Application manual - Functional safety and SafeMove*.

Note

Function of viewing the safety controller configurations is available only for RobotWare in version 7.10 or later.

Note

To work with the functions in **Configuration** tab and **Cyclic Brake Check** tab, make sure the controller is connected via the MGMT port and the writing access is requested.

The **Configuration** tab

The **Configuration** tab shows the status of the safety configuration file. From the configuration tab it is possible to view the safety configuration, validate, and lock the configuration file.

Safety Config Status	Description
Not Validated/Validated	Validate the safety configuration and then click the checkbox to confirm the validation. Then, the status of the configuration is changed to **Validated**.
Not Locked/Locked	Click the checkbox to approve the safety configuration, the status of the configuration is changed to **Locked**.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

The **Mode** tab

The operating mode of the safety controller is displayed in the status bar.

Mode	Description
Safety Supervision Mode	The safety supervision mode is the default mode where the safety supervision is active.
Commissioning Mode	Commissioning mode is intended to be used before the safety PLC is connected and functional. In commissioning mode, the selected signals are set high for not triggering stops. Commissioning mode is allowed in automatic operating mode, but the power to the actuators is disabled and the robot is prohibited from movement. **DANGER** Using the function commissioning mode compromises the safety.
Service Mode	Service mode is intended to be used during service and commissioning. In service mode all safety supervision is deactivated, so it is possible to jog and run the robot without limitations. The violation output signals are set high, indicating no violation. The communication to the safety PLC is active so the configured safety stops are active. Service mode is only allowed in manual mode. If the operating modes manual full speed or automatic mode is selected, then service mode is deactivated and safety supervision mode is activated by the safety controller.

The **Synchronization** tab

The safety controller synchronization status is indicated by the status LED in **Synchronization** tab.

The **Status** LED has the following indication:

- Green - Synchronized
- Red - Unsynchronized
- Grey - Undefined, no information is present.

The **Stop Status** tab

The **Stop Status** tab is only present when a *Stop configuration* is configured in the safety configuration. Up to 8 stop configurations are shown with a green or red LED indicating the status.

The **Cyclic Brake Check** tab

Cyclic Brake Check is a function that verifies that the brakes work correctly. The **Cyclic Brake Check** tab is only present for CRB 1100, CRB 1300 and CRB 15000 robots that already have SafeMove configured.

From the Cyclic Brake Check tab it is possible to view the check interval and check status, and also initiate a new round of cyclic brake check.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

Working with data and I/O

Position data

From the program window, it is possible to work with the position data, both robtargets and jointtargets, by clicking the required one in the window first and then clicking corresponding button at the bottom of the working area. You can:

- move the robot to a specified target position by clicking **Go to position**.

  A dialog box is displayed, promoting you to confirm or select the required motion type according to the target type and robot type.

Target	Robot type	Motion type	Description
robottarget	Other than SCARA robots	Linear	The robot moves to the target position along a linear path.
	SCARA robots	Linear	The robot moves to the target position along a linear path.
		PnP	The robot moves to the target position along a pick and place path, which includes two vertical movements connected by a connection path. You should set the height for the axis 3 to move in the **Axis 3 (mm)** text box. Then, the robot TCP is moved to the target position as follows: 1 The TCP moves vertically from the current robot position to a point that is computed as the start point of the connection path. 2 The TCP transits to the connection path with path zone of z5 until reaches the specified height, and then moves along the connection path. 3 The TCP continues to move to a point that is computed as the end point of the connection path, and then transits to a point above/down to the target position with path zone of z5. 4 The TCP moves vertically to the target position.
jointtarget	Any	AbsJ	The robot moves to an absolute position defined in axes positions.

Note

If the controller is connected via WAN port, moving functions are available to use only after the token is verified. For details, see *Enabling moving functions on page 31*.

- update the current robot position by clicking **Update position**.
- manually edit the robot position by clicking **Edit position**.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

You can also click the **Data & IO** button at the bottom of the working area and access the position data in the **POSITION** tab page. In this tab page, click the **More options** button to work with the data.

If multiple tasks exist, **Go to position** and **Update position** are available only to position data in Motion tasks.

Tool data

Click the **Data & IO** button at the bottom of the working area and access the tool data in the **TOOLDATA** tab page.

In the **TOOLDATA** tab page, click the **More options** button to:

- manually edit the tool data by clicking **Edit**.
- define the tool position and orientation by clicking **Define**.
  - in the **DEFINE POSITION** tab page, move the joints to four approach points and define the positions by clicking **Modify Position**.

    Note

    You can also load existing calibrated positions by click the **Load** icon in **DEFINE POSITION** tab page. In the displayed page, choose the required module and then click **Load**.

    When loading, if there are targets naming as *pTCP_Point1*, *pTCP_Point2*, *pTCP_Point3* and *pTCP_Point4*, these targets will be loaded; otherwise, a dialog box is displayed, asking whether to load the first four targets in the module. If the module contains less than the required four targets, then all the targets will be loaded. In this case, you need to define the remaining positions.

  - in the **DEFINE ORIENTATION** tab page, select a method for setting the orientation.

    Note

    If the method **TCP & Z** or **TCP & Z,X** is selected, you can also load existing calibration orientations by click the **Load** icon in **DEFINE ORIENTATION** tab page. In the displayed page, choose the required module and then click **Load**.

    When loading, if there are targets naming as *pRef*, *pElongatorZ* and *pElongatorX*, these targets will be loaded; otherwise, a dialog box is displayed, asking whether to load the first two or three targets in the module, depending on the selected method. If the module contains less than the required two or three targets, then all the targets will be loaded. In this case, you need to define the remaining orientations.

  - in the **RESULT** tab page, check the results and click **Apply**.

    If the **Save calibration positions** checkbox is selected, the results will also be saved in a new program module that is named as *Calib_toolX* by default.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

- perform load identification by clicking **Load Identify**.

  In the displayed window, click **OK** to run the load identification. The tool load will be automatically identified.

  Before running the load identification, turn the motor on and make sure the tool is in horizontal position.

If multiple tasks exist, **Define** and **Load Identify** are available only to tool data in Motion tasks.

Load data

Click the **Data & IO** button at the bottom of the working area and access the load data in the **LOADDATA** tab page.

In the **LOADDATA** tab page, click the **More options** button to:

- manually edit the load data by clicking **Edit**.
- perform load identification by clicking **Load Identify**.

  In the displayed window, click **OK** to run the load identification. The payload will be automatically identified.

  Before running the load identification, turn the motor on.

If multiple tasks exist, **Load Identify** is available only to load data in Motion tasks.

Workobject data

Click the **Data & IO** button at the bottom of the working area and access the object data in the **WOBJDATA** tab page.

In the **WOBJDATA** tab page, click the **More options** button to:

- manually edit the tool data by clicking **Edit**.
- define the work object coordinate system by clicking **Define**.
  - in the **DEFINE FRAME** tab page, select the frame to be defined first, and then move the joints to three approach points and modify the positions.

    Note

    You can also load existing calibrated positions by click the **Load** icon in **DEFINE FRAME** tab page. In the displayed page, choose the required module and then click **Load**.

    For **User frame**, if there are targets naming as *pWobj_U_PointX1*, *pWobj_U_PointX2* and *pWobj_U_PointY1*, these targets will be loaded. For **Object frame**, if there are targets naming as *pWobj_O_PointX1*, *pWobj_O_PointX2* and *pWobj_O_PointY1*, these targets will be loaded. Otherwise, a dialog box is displayed, asking whether to load the first three targets in the module. If the module contains less than the required three targets, then all the targets will be loaded. In this case, you need to define the remaining positions.

  - in the **RESULT** tab page, check the results and click **Apply**.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

If the **Save calibration positions** checkbox is selected, the results will also be saved in a new program module that is named as *Calib_Def_wobjX* by default.

If multiple tasks exist, **Define** is available only to object data in Motion tasks.

Variables

Click the **Data & IO** button at the bottom of the working area, and access the number and string variables in the **123 NUMBER** and **ABC STRING** tab pages, respectively.

In the corresponding tab page, click the **More options** button and choose **Edit** to manually edit the value of the selected variable.

IO

Click the **Data & IO** button at the bottom of the working area and access the IO list in the **IO** tab page. The IO signals can be viewed in one page, or you can switch the view mode by clicking **IO Devices** to view the IO signals in groups by devices they are assigned to.

If the **Device Trust Level** is set to **Allow Deactivate**, the IO devices could be deactivated or activated by click the **More options** button and then select **Deactivate** or **Activate**.

To change the IO signal, the **Access Level** of the IO must be **All**. Otherwise, a failure message is displayed.

Editing the RAPID program

Adding a Move instruction

From the program window, it is possible to add a Move instruction to the RAPID program:

1. Click a RAPID instruction line after which the Move instruction will be added.
2. Click **Add Move instruction** at the bottom of the working area.
3. In the displayed dialog box:
   a. Choose a movement type from the **Instruction type** drop-down list.

      Movement types MoveJ, MoveL and MoveAbsJ are available to choose.
   b. Keep the current robot position or choose an exiting position from the **Position** drop-down list.

      If keeping the current robot position,
      - for MoveJ and MoveL instructions: a position data in data type `robtarget` is generated with default name *RCM_PosX*. The name can be modified.
      - for MoveAbsJ instructions: a position data in data type `jointtarget` is generated with default name *RCM_jPosX*. The name can be modified.

      The module to which the position data belongs is displayed as the scope information.
   c. Set the movement speed, zone data and tool from the **Speed**, **Zone** and **Tool** drop-down list, respectively.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

4.3.2 Procedure
Continued

4 Click **Apply**.
- If there is no PP in the program, the movement instruction is added and also saved to the current program module.
- If there is PP in the program, a warning message is displaying, indicating that PP will lost after apply. Click **Apply** to continue and save the movement instruction to the current program module. You can also click **Cancel** to discard all settings.

Editing a Move instruction

From the program window, it is possible to modify a Move instruction in the RAPID program:

1 Click the required Move instruction.
2 Click **Edit** at the bottom of the working area.
3 In the displayed dialog box:
   a Modify the movement type by choosing the required one from the **Instruction type** drop-down list.

     Movement type MoveAbsJ cannot be changed.
   b Modify the position by clicking the **+** icon to add the current robot position or choosing an exiting position from the **Position** drop-down list.

     If keeping the current robot position,
     - for MoveJ and MoveL instructions: a position data in data type `robtarget` is generated with default name *RCM_PosX*. The name can be modified.
     - for MoveAbsJ instructions: a position data in data type `jointtarget` is generated with default name *RCM_jPosX*. The name can be modified.

     The module to which the position data belongs is displayed as the scope information.
   c Modify the movement speed, zone data and tool from the **Speed**, **Zone** and **Tool** drop-down list, respectively.
4 Click **Apply**.
   - If there is no PP in the program, the movement instruction is modified and also saved to the current program module.
   - If there is PP in the program, a warning message is displaying, indicating that PP will lost after apply. Click **Apply** to continue and save the modified movement instruction to the current program module. You can also click **Cancel** to discard all settings.

Deleting an instruction

From the program window, it is possible to delete an instruction from the RAPID program:

1 Click the required instruction.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

2 Click the **More options** icon at the bottom of the working area and then choose **Delete**.
   - If there is no PP in the program, a warning message is displaying, indicating that the deletion cannot be undone.
   - If there is PP in the program, a warning message is displaying, indicating that the deletion cannot be undone and PP will lost after apply.
3 Click **Apply** to continue.

   The instruction is deleted.

   You can also click **Cancel** to discard all settings.

Modifying the value of a variable or an IO

From the program window, it is possible to modify the current value of a number variable, a string variable or an IO:

1 Click the required variable or IO in the program.
2 Click **Edit variable** or **Change IO value** at the bottom of the working area.
3 In the displayed dialog box, enter the value in the text box.
4 Click **Save**.

   The current value of the selected variable or IO is changed. Note that this change does not affect the RAPID program.

© Copyright 2019-2023 ABB. All rights reserved.

This page is intentionally left blank

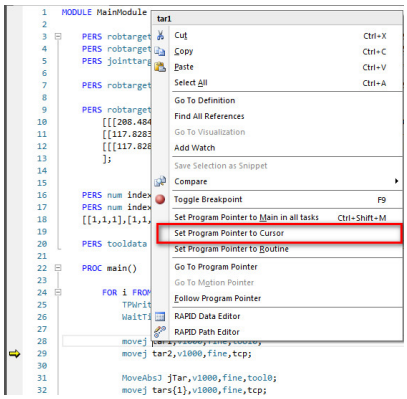
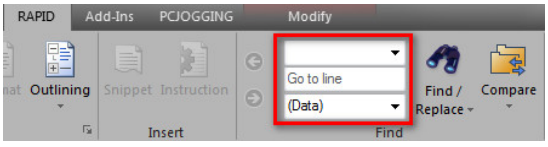
5 Reference information

5.1 Features in RobotStudio

Feature list

The following table provides the features in RobotStudio that will be used together with the Robot Control Mate when operating a robot system.

For more details about how to use the RobotStudio features, refer to the popup message displayed in RobotStudio or see *Operating manual - RobotStudio*.

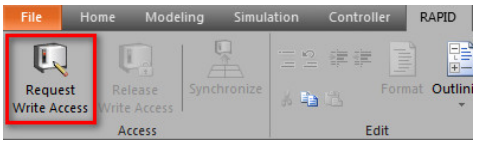
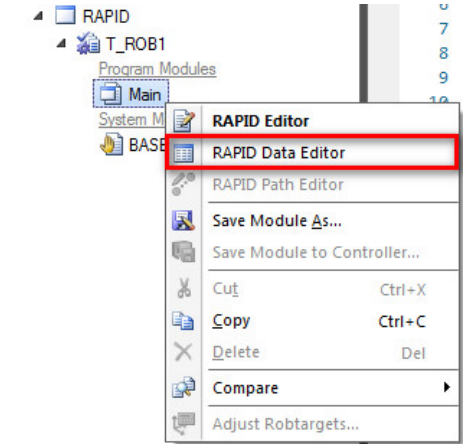
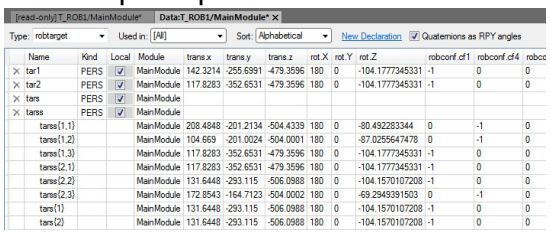
Feature group	Feature	Action
Operation	Run from the current cursor	1 Make sure the RAPID program is opened by double-clicking the specific RAPID module from the **Controller** navigation tree. 2 In the **RAPID** ribbon tab, click **Request Write Access** in the Access group. 3 Right-click the line where the cursor is and choose **Set Program Point to Cursor** from the shortcut list.  xx1900001401 4 Click **Play** in the **Control** tab and then the program will run from the line where the cursor is. **Note** The find a desired line or program module, type the required line number or choose the module from the list in the **Find** group in the **RAPID** ribbon tab  xx1900001367

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

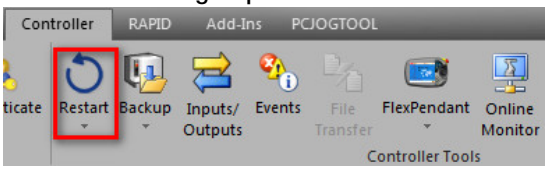
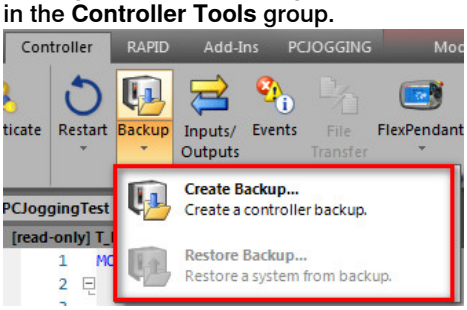
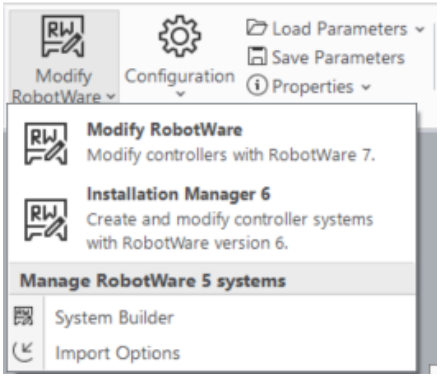
5.1 Features in RobotStudio

Continued

Feature group	Feature	Action
Programming	Online programming	1 Make sure the RAPID program is opened by double-clicking the specific RAPID module from the **Controller** navigation tree. 2 In the **RAPID** ribbon tab, click **Request Write Access** in the Access group. Then, the RAPID script can be edited and programmed.  xx1900001369
	RAPID data editing	Right-click a specific RAPID module from the **Controller** navigation tree and then choose **RAPID Data Editor**.  xx1900001368
	Specific point data editing	In the **RAPID Data Editor** window, edit the detailed data of a specific point.  xx1900001402

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

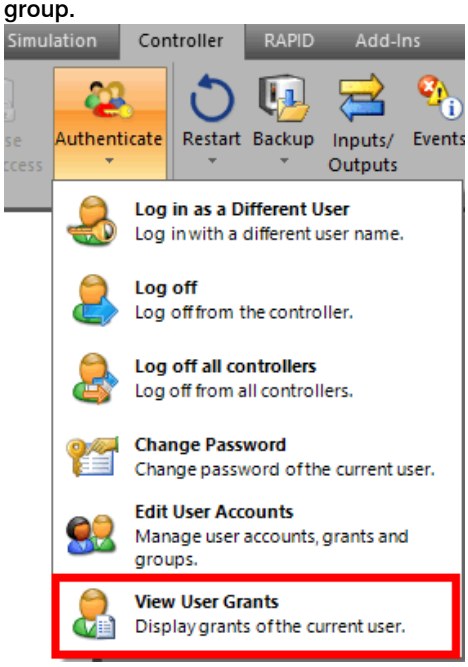
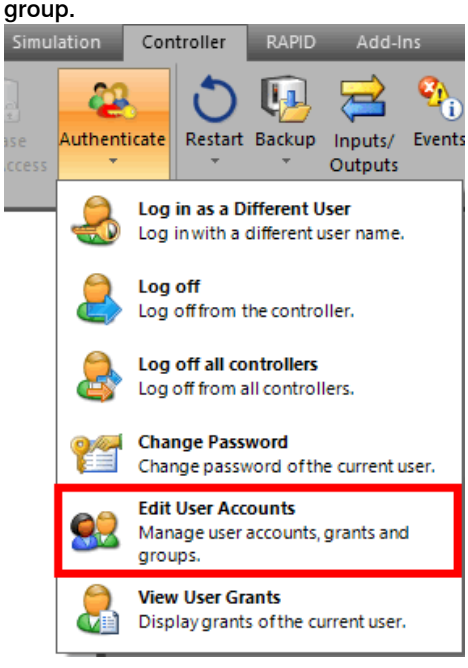
Feature group	Feature	Action
Controller management	System restart	In the **Controller** ribbon tab, click **Restart** in the **Controller Tools** group.  xx1900001329
	System backup and restore	In the **Controller** ribbon tab, choose **Create Backup** or **Restore Backup** from the **Backup** list in the **Controller Tools** group.  xx1900001370
	System installation	In the **Controller** ribbon tab, select the **Modify RobotWare** dialog.  xx2300001412

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

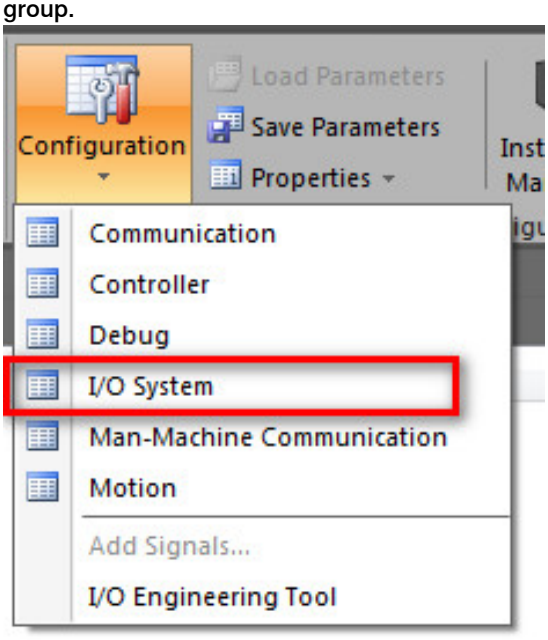
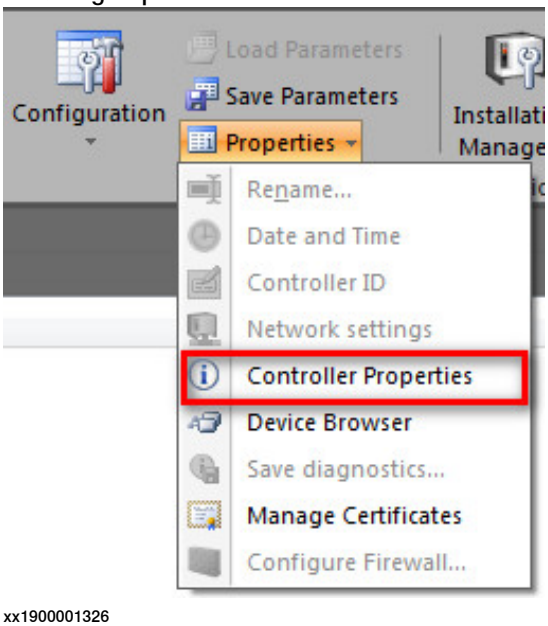
5.1 Features in RobotStudio

Continued

Feature group	Feature	Action
User right management	User grant viewing	In the **Controller** ribbon tab, choose **View User Grants** from the **Authenticate** list in the Access group.  xx2100000399
	User grant editing	In the **Controller** ribbon tab, choose **Edit User Accounts** from the **Authenticate** list in the Access group.  xx2100000400

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

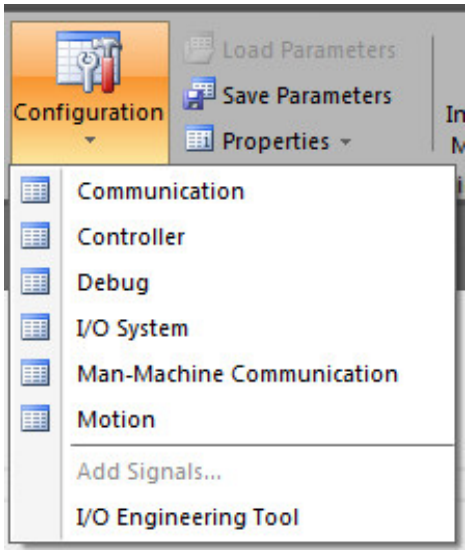
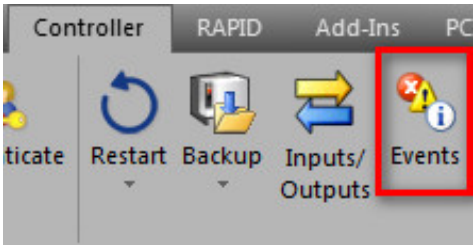
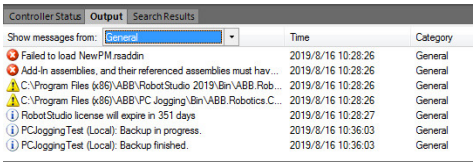
Feature group	Feature	Action
System status and configuration	I/O status checking	In the **Controller** ribbon tab, choose **I/O System** from the **Configuration** list in the **Configuration** group.  xx1900001327
	System information checking	In the **Controller** ribbon tab, choose **Controller Properties** from the **Properties** list in the **Configuration** group.  xx1900001326
	System configuration	In the **Controller** ribbon tab, choose the required item from the **Configuration** list in the **Configuration** group.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

5.1 Features in RobotStudio

Continued

Feature group	Feature	Action
		 xx1900001371
Log	Log viewing	View the logs by either of the following methods: • In the **Controller** ribbon tab, click **Events**.  xx1900001373 • Check the logs from the **Output** area at the bottom of the RobotStudio window.  xx1900001374

© Copyright 2019-2023 ABB. All rights reserved.

5.2 Scenarios for controllers with FlexPendant

Overview

The Robot Control Mate is mainly used for the controller without a FlexPendant. The FlexPendant can be disconnected from the controller in automatic mode. To disconnect the FlexPendant in automatic mode the user must have the **Safety Services** grant. The administrator must provide this grant using the **UAS Administration Tool** in RobotStudio.

> **Note**
>
> In cases where the controller is replaced with a new main computer, a FlexPendant is required after the replacement to be able to change to automatic mode. Otherwise, the controller starts in manual mode and the Robot Control Mate is unable to use.

This section describes how to properly disconnect the FlexPendant from a controller.

Disconnecting the FlexPendant

> **Note**
>
> The disconnection operation can only be executed on the FlexPendant. Do not use the Robot Control Mate to disconnect the FlexPendant.

1. On the status bar, tap the **QuickSet** button.

   The **QuickSet** window is displayed.
2. Tap the **Info** tab.

   The **System Info** window is displayed.
3. Check the robot type and options.

   Make sure the robot type is supported and the option 3018-1 Hot Swappable FlexPendant exists.

   > **Note**
   >
   > If the controller does not have the option 3018-1 Hot Swappable FlexPendant, contact ABB to install the RobotWare version with the option.
4. Tap the **Control** tab.

   The **Control Panel** window is displayed.
5. In the **Mode** section, check the operating mode and make sure the system is in Auto mode.
6. Tap the **Logout/Restart** tab.

   The **Logout/Restart** window is displayed.
7. Tap **Detach FlexPendant** in the **FlexPendant** section.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

A message is displayed, prompting to disconnect the FlexPendant within 30 seconds.

> **Note**
>
> The logged-in user must be the one has sufficient grant to disconnect the FlexPendant. If not, you will get a permission denied message. In this case, click **Log out** in the **Current User** section. Then, log in again using the user with the Safety Service permission is granted.

8 Tap **Disconnect**.

A popup window with 30 seconds countdown timer is displayed.

9 Disconnect the FlexPendant within 30 seconds.

© Copyright 2019-2023 ABB. All rights reserved.

6 Troubleshooting

6.1 What should I do if I experience a certificate failure when opening Robot Control Mate Web?

Symptom

When working with Robot Control Mate Web, a page showing warning message "Your connection is not private" is displayed after entering the IP address of the connected controller in the address bar of the browser.

Cause

Certificates are used to provide secure communication over the network, and the robot controller is delivered with a self-signed certificate installed. Self-signed certificate is one certificate not signed by a CA at all, neither private nor public. In this case, the certificate is signed with its own private key, instead of requesting it from a public or a private CA.

Self-signed certificates can also create several risks without proper visibility and control. Then the error is displayed on the browser.

Solution

To ensure a trusted connection, it is recommended to replace the certificates of the controller with the certificates that are trusted by the PCs, which will be connected to the controller. RobotStudio supports only PEM (.pem) certificate. Refer *Operating manual - Integrator's guide OmniCore* for more information on certificate handling.

Workaround

You can use the following procedure to add the self-signed certificate to the browser’s secure certificate list and avoid the warning page.

WARNING

Using self-signed certificate in a production environment leaves the systems exposed to vulnerabilities and security breaches. The users data shared through the controller can be easily intercepted by malicious attackers.

Make sure this procedure is only used temporarily in a test and safe environment.

Note

The following procedure takes Google Chrome as an example. Access to corresponding privacy setting window if working with other browsers.

1. Click **Not secure** in the address bar.
2. Click the **Show certificate** icon next to **Certificate is not valid**.
3. Click the **Details** tab in the displayed **Certificate** dialog box.
4. Click **Copy to File**.

Continues on next page

© Copyright 2019-2023 ABB. All rights reserved.

6.1 What should I do if I experience a certificate failure when opening Robot Control Mate Web?
Continued

5 Follow the instructions in the **Certificate Export Wizard** to export the certificate file.
   - Remain the default file format **DER endoded binary X.509 (.CER)**.

   The certificate file is successfully exported.
6 Enter the browser settings page.
7 Choose **Privacy and security** > **Security** > **Manage certificates**.
8 In the displayed Certificates dialog box, click the **Trusted Root Certification Authorities** tab.
9 Click **Import** in the displayed tab page.
10 Follow the instructions in the **Certificate Import Wizard** to import the certificate file.
   - Keep the **Certificate store** as **Trusted Root Certification Authorities**.
   - Confirm the certificate installation by clicking **Yes** in the **Security Warning** dialog box.

   The certificate file is successfully imported and **Not secure** is replaced by the **Lock** icon in the address bar.

© Copyright 2019-2023 ABB. All rights reserved.

Index

N
network security, 18

© Copyright 2019-2023 ABB. All rights reserved.

ABB AB
Robotics & Discrete Automation
S-721 68 VÄSTERÅS, Sweden
Telephone +46 10-732 50 00

ABB AS
Robotics & Discrete Automation
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 22 87 2000

ABB Engineering (Shanghai) Ltd.
Robotics & Discrete Automation
No. 4528 Kangxin Highway
PuDong New District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

ABB Inc.
Robotics & Discrete Automation
1250 Brown Road
Auburn Hills, MI 48326
USA
Telephone: +1 248 391 9000

abb.com/robotics

3HAC073107-001, Rev P, en

© Copyright 2019-2023 ABB. All rights reserved.
Specifications subject to change without notice.